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OKLAHOMA CITY, OK 73113

MAILED

JUL 26 2021

CENTRAL REEXAMINATION UNIT

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/014,795* .

PATENT UNDER REEXAMINATION *10329653* .

ART UNIT *3991* .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

DUNLAP CODDING, P.C.

JUL 30 2021

Order Granting Request For Ex Parte Reexamination	**Control No.** 90/014,795	**Patent Under Reexamination** 10329653	
	Examiner SEAN E VINCENT	**Art Unit** 3991	**AIA (FITF) Status** Yes

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

The request for *ex parte* reexamination filed 07/06/2021 has been considered and a determination has been made. An identification of the claims, the references relied upon, and the rationale supporting the determination are attached.

Attachments: a)☐ PTO-892, b)☑ PTO/SB/08, c)☐ Other: ____

1. ☑ The request for *ex parte* reexamination is GRANTED.

RESPONSE TIMES ARE SET AS FOLLOWS:

For Patent Owner's Statement (Optional): TWO MONTHS from the mailing date of this communication (37 CFR 1.530 (b)). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).**

For Requester's Reply (optional): TWO MONTHS from the **date of service** of any timely filed Patent Owner's Statement (37 CFR 1.535). **NO EXTENSION OF THIS TIME PERIOD IS PERMITTED.** If Patent Owner does not file a timely statement under 37 CFR 1.530(b), then no reply by requester is permitted.

/Sean E Vincent/ Patent Reexam Specialist, Art Unit 399		

cc:Requester (if third party requester)

Reexamination

Order Granting Ex Parte Reexamination

A substantial new question of patentability affecting claims 1-5, 7-9, 11-16, 18-21,23-50, 52-62, 64, 66, 67 and 69-76 of United States Patent Number 10,329,653 (hereinafter referred to as *the '653 Patent*) is raised by the request for *ex parte* reexamination filed by the Requester on 06 July 2021.

Procedural Posture

07/06/2021: A Request for *Ex Parte* Reexamination for claims 1-5, 7-9, 11-16, 18-21,23-50, 52-62, 64, 66, 67 and 69-76 of the '653 Patent was filed.

07/15/2021: A Notice of Reexamination Request Filing Date granting 07/06/2021 as the filing date of this reexamination was mailed.

The '653 Patent

The '653 Patent to Doud et al., issued on 06/25/2019 with 78 claims. Claims 1, 12, 25, 29, 33, 37, 41, 45, 49, 73 and 74 are the independent claims that read as follows:

> 1. A magnesium composite that includes in situ precipitation of galvanically-active intermetallic phases to enable controlled dissolution of said magnesium composite, said magnesium composite comprising a mixture of magnesium or a magnesium alloy and an additive material, said additive material having a greater melting point temperature than a solidus temperature of said magnesium, said additive material constituting about 0.05 wt. %-45 wt. % of said mixture, said additive material forming precipitant in said magnesium composite, said

additive material includes one or more metals selected from the group consisting of copper, nickel, iron, and cobalt, said magnesium composite has a dissolution rate of at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

12. A magnesium composite that includes in situ precipitation of galvanically-active intermetallic phases to enable controlled dissolution of said magnesium composite comprising a mixture of a magnesium or a magnesium alloy and an additive material, said additive material having a greater melting point temperature than a solidus temperature of said magnesium, said composite including greater than 50 wt. % magnesium, said additive material constituting about 0.05-45 wt. % of said magnesium composite, said additive material having a melting point temperature that is 100° C. greater than a melting temperature of said magnesium or magnesium alloy, said additive material including one or more metals selected from the group consisting of copper, nickel, cobalt, titanium, and iron, at least a portion of said additive material remaining unalloyed additive material, said magnesium composite including in situ precipitation of galvanically-active intermetallic phases that includes said unalloyed additive material, said magnesium composite has a dissolution rate of at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

25. A dissolvable magnesium alloy composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium alloy composite comprising at least 85 wt. % magnesium; one or more metals selected from the group consisting of 0.5-10 wt. % aluminum, 0.05-6 wt. % zinc, 0.01-3 wt. % zirconium, and 0.15-2 wt. % manganese; and about 0.05-45 wt. % of a secondary metal to form a galvanically-active intermetallic particle that promotes corrosion of said dissolvable magnesium alloy composite, said secondary metal including one or more metals selected from the group consisting of copper, nickel, cobalt, titanium and iron, said magnesium alloy composite has a dissolution rate of at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

29. A dissolvable magnesium alloy composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium alloy composite comprising 60-95 wt. % magnesium; 0.01-1 wt. % zirconium; and about 0.05-45 wt. % of a secondary metal to form a galvanically-active intermetallic particle that promotes corrosion of said dissolvable magnesium alloy composite, said secondary metal including one or more metals selected from the group consisting of copper, nickel, cobalt, titanium and iron, said magnesium alloy composite has a dissolution rate of at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

33. A dissolvable magnesium alloy composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium alloy composite comprising 60-95 wt. % magnesium; 0.5-10 wt. % aluminum; 0.05-6 wt. % zinc; 0.15-2 wt. % manganese; and about 0.05-45 wt. % of a secondary metal to form a galvanically-active intermetallic particle that promotes corrosion of said dissolvable magnesium alloy composite, said secondary metal including one or more metals selected from the group consisting of copper, nickel, cobalt, titanium and iron, said magnesium alloy composite has a dissolution rate of at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

37. A dissolvable magnesium alloy composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium alloy composite comprising 60-95 wt. % magnesium; 0.05-6 wt. % zinc; 0.01-1 wt. % zirconium; and about 0.05-45 wt. % of a secondary metal to form a galvanically-active intermetallic particle that promotes corrosion of said dissolvable magnesium alloy composite, said secondary metal including one or more metals selected from the group consisting of copper, nickel, cobalt, titanium and iron, said magnesium alloy composite has a dissolution rate of at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

41. A dissolvable magnesium alloy composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium

alloy composite comprising over 50 wt. % magnesium; one or more metals selected from the group consisting of 0.5-10 wt. % aluminum, 0.1-2 wt. % zinc, 0.01-1 wt. % zirconium, and 0.15-2 wt. % manganese; and about 0.05-45 wt. % of a secondary metal to form a galvanically-active intermetallic particle that promotes corrosion of said dissolvable magnesium alloy composite, said secondary metal including one or more metals selected from the group consisting of copper, nickel and cobalt, said magnesium alloy composite has a dissolution rate of at least 5 $mg/cm^2/hr.$ in 3 wt. % KCl water mixture at 90° C.

45. A dissolvable magnesium alloy composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium alloy composite comprising over 50 wt. % magnesium; one or more metals selected from the group consisting of 0.1-3 wt. % zinc, 0.01-1 wt. % zirconium, 0.05-1 wt. % manganese, 0.0002-0.04 wt. % boron, and 0.4-0.7 wt. % bismuth; and about 0.05-45 wt. % of a secondary metal to form a galvanically-active intermetallic particle that promotes corrosion of said dissolvable magnesium alloy composite, said secondary metal including one or more metals selected from the group consisting of copper, nickel, and cobalt, said magnesium alloy composite has a dissolution rate of at least 5 $mg/cm^2/hr.$ in 3 wt. % KCl water mixture at 90° C.

49. A magnesium composite that includes in situ precipitation of galvanically-active intermetallic phases to enable controlled dissolution of said magnesium composite, said magnesium composite comprising a mixture of magnesium or a magnesium alloy and an additive material, said additive material constituting about 0.05-45 wt. % of said mixture, said additive material includes one or more metals selected from the group consisting of copper, nickel, titanium, iron, and cobalt, said magnesium composite including in situ precipitation of galvanically-active intermetallic phases that include said additive material, said additive material located in sufficient quantities in said galvanically-active intermetallic phases so as to obtain a composition and morphology of said galvanically-active intermetallic phases such that a

galvanic corrosion rate along said galvanically-active intermetallic phases causes said magnesium composite to have a dissolution rate of at least at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

73. A dissolvable magnesium composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium composite includes in situ precipitation of galvanically-active intermetallic phases to enable controlled dissolution of said magnesium composite, said magnesium composite comprising a mixture of magnesium or a magnesium alloy and an additive material, said additive material constituting about 0.05 wt. % of said mixture, said additive material is a metal or metal alloy, said additive material includes one or more metals selected from the group consisting of copper, nickel, titanium, iron, silicon, and cobalt, said magnesium composite including in situ precipitation of galvanically-active intermetallic phases that include said additive material, said additive material located in sufficient quantities in said galvanically-active intermetallic phases so as to obtain a composition and morphology of said galvanically-active intermetallic phases such that a galvanic corrosion rate along said galvanically-active intermetallic phases causes said magnesium composite to have a dissolution rate of at least at least 5 mg/cm^2/hr. in 3 wt. % KCl water mixture at 90° C.

74. A dissolvable magnesium composite for use in a ball or other tool component in a well drilling or completion operation, said dissolvable magnesium composite includes in situ precipitation of galvanically-active intermetallic phases to enable controlled dissolution of said magnesium composite, said magnesium composite comprising a mixture of magnesium or a magnesium alloy and an additive material, said additive material constituting at least 0.1 wt. % of said mixture, said magnesium in said magnesium composite constituting at least 85 wt. %, said additive material is a metal material selected from the group consisting of copper, nickel and cobalt, said magnesium composite including in situ precipitation of galvanically-active

intermetallic phases that include said additive material, said magnesium composite has a dissolution rate of 84-325 mg/cm²/hr. in 3 wt. % KCl water mixture at 90° C.

Information Disclosure Statement

All references cited in the Request are listed on the PTO-SB/08 filed with the reexamination request. All cited documents have been reviewed and considered.

Prior Art Documents Cited in the Request as Raising an SNQ

1. Chinese Pat Pub. No. CN 103343271A to Xiao et al. published 9 October 2013. (Certified English Language Translation, Hereafter, "Xiao")

2. *Development of High Strength Magnesium Based Composites Using Elemental Nickel Particulates as Reinforcement.* Hassan, S.F., Gupta, M, Journal of Materials Science 37, 2467-2474 (2002). (Hereafter, "Hassan")

Substantial New Questions of Patentability (SNQ)

The presence or absence of "a substantial new question of patentability" determines whether or not reexamination is ordered.

For "a substantial new question of patentability" to be present, it is only necessary that:

A) the prior art patents and/or printed publications raise a substantial question of patentability regarding at least one claim, i.e., the teaching of the (prior art) patents and printed publications is such that a reasonable examiner would consider the teaching to be important in deciding whether or not the claim is patentable; and

B) the same question of patentability as to the claim has not been decided by the Office in a previous examination or pending reexamination of the patent or in a final holding of invalidity by the Federal Courts in a decision on the merits involving the claim.

A SNQ may be based solely on old art where the old art is being presented/viewed in a new light, or in a different way, as compared with its use in the earlier concluded examination(s), in view of a material new argument or interpretation presented in the request. (MPEP 2242, section II A).

MPEP §2217 (III) states: The consideration under 35 USC §303 of a request for ex parte reexamination filed under 35 USC §302 is limited to prior art patents and printed publications. See *Ex parte McGaughey*, 6 USPQ2d 1334, 1337 (Bd. Pat. App. & Inter. 1988). Thus, an admission, per se, may not be the basis for establishing a substantial new question of patentability. ***However, an admission by the patent owner of record in the file or in a court record may be utilized in combination with a patent or printed publication.*** (emphasis added)

Existence of Substantial New Questions of Patentability

SNQ 1: The Request indicates that Requester considers Xiao as raising a substantial new question of patentability as to claims 1-5, 9, 11, 29-32, 37-50, 52-54, 56-62, 64, 66, 67, 69, 70 and 72-73 of the '653 Patent.

It is agreed that consideration Xiao raises a SNQ as to claims 1-5, 9, 11, 29-32, 37-50, 52-54, 56-62, 64, 66, 67, 69, 70 and 72-73 of the '653 Patent.

The above substantial new question of patentability is based solely on patents and/or printed publications already cited/considered in an earlier concluded examination

or review of the patent being reexamined, or has been raised to or by the Office in a pending reexamination or supplemental examination of the patent. On November 2, 2002, Public Law 107-273 was enacted. Title III, Subtitle A, Section 13105, part (a) of the Act revised the reexamination statute by adding the following new last sentence to 35 U.S.C. 303(a) and 312(a):

"The existence of a substantial new question of patentability is not precluded by the fact that a patent or printed publication was previously cited by or to the Office or considered by the Office."

For any reexamination ordered on or after November 2, 2002, the effective date of the statutory revision, reliance on previously cited/considered art, i.e., "old art," does not necessarily preclude the existence of a substantial new question of patentability (SNQ) that is based exclusively on that old art. Rather, determinations on whether a SNQ exists in such an instance shall be based upon a fact-specific inquiry done on a case-by-case basis. (see MPEP 2258.01)

In the present instance, there exists a SNQ based solely on Xiao. A discussion of the specifics now follows:

Xiao teaches magnesium composites made of "a magnesium alloy with a high aluminum content (13 to 25% by weight) and a high zinc content (2 to 10% by weight), and further adds elements of Fe, Cu, Ni and Ag which can enhance the corrosion performance of the magnesium alloy" (see [0026] of English language translation). Xiao also teaches "the matrix and the grain boundary of the magnesium alloy form a large amount of micro-batteries, which greatly accelerate the corrosion decomposition of

magnesium alloy." (see [0026]). Claims 1-3 of Xiao directly state the magnesium alloy's composition:

> 1. A light and pressure-proof fast-decomposed cast magnesium alloy, comprising the components at the weight percentages as follows:
> Al: 13 to 25%,
> Zn: 2 to 15%,
> the remainder is Mg, and a sum of the weight percentages of the components is 100%.
>
> 2. The light and pressure-proof fast-decomposed cast magnesium alloy according to claim 1, further comprising the trace elements at the weight percentages as follows:
> Fe: 0.1 to 5%,
> Cu: 0.05 to 5%,
> Ni: 0.05 to 5%,
> Zr: 0.05 to 0.5%,
> Ti: 0.05 to 0.5%; and a sum of the weight percentages of the components is 100%.
>
> 3. The light and pressure-proof fast-decomposed cast magnesium alloy according to claim 2, further comprising 0 to 5% by weight of trace element Ag, and the sum of the weight percentages of the components is 100%.

Seven example compositions in weight percent are taught in Xiao as seen in original Table 1 as well as the certified translation: (See [0061], AZ91D is the known alloy for comparison).

Table 1:

Alloy	Al	Zn	Fe	Ni	Cu	Ag	Ti	Zr	Mn	Mg
Comparative example 1 (AZ91D)	9.00	1.00	0	0	0	0	0	0.01	0.03	remainder
Example 1	13	1.3	0.1	5	0	2.5	0.5	0.5	0	remainder
Example 2	15	5	0.5	0.1	0	0	0.1	0.1	0	remainder
Example 3	20	10	5	2.5	2.5	5	0.25	0.25	0	remainder
Example 4	18	8	2.5	2.0	5	1	0.3	0.15	0	remainder
Example 5	20	5	0.8	0.05	0.05	0	0.05	0.1	0	remainder
Example 6	15	6	1.5	0.2	1	2	0.15	0.1	0	remainder
Example 7	25	10	1	0.5	0.1	0	0.5	0.05	0	remainder

The decomposition rates in 3% KCl solution of all eight compositions are taught in Xiao's Table 2:

	Room temperature tensile strength σ_b (MPa)	Decomposition rate at 70 °C in 3% KCl solution ($g.cm^{-2}.h^{-1}$)	Decomposition rate at 93 °C in 3% KCl solution ($g.cm^{-2}.h^{-1}$)
Comparative example 1	232	0.00026	0.0005
Example 1	360	0.035	0.074
Example 2	385	0.015	0.045
Example 3	410	0.013	0.036
Example 4	375	0.034	0.058
Example 5	392	0.025	0.048
Example 6	365	0.021	0.063
Example 7	387	0.036	0.057

Xiao teaches that its magnesium alloys "can be used as a tripping ball material for a multi-stage sliding sleeve staged-fracturing technique" in [0001] and explains with detail how the tripping ball is used in well drilling in [0002].

Xiao was considered in an information disclosure statement but relied upon in the prosecution of the patent application which resulted in the '653 Patent. Therefore the teaching of Xiao represents a new, non-cumulative teaching including old teachings presented in a different way, as compared with its use in the earlier concluded examination resulting in the '462 Patent. Further, there is a substantial likelihood that a reasonable examiner would consider these teachings important in deciding whether or not these claims are patentable. Accordingly, Xiao raises a substantial new question of patentability as to claims 1-5, 8, 9, 11, 25-50, 52-62, 64, 66, 67, 69, 70 and 72-78 of the '653 Patent, which question has not been decided in a previous examination or reexamination of the '653 Patent.

SNQ 2: The Request indicates that Requester Xiao and Hassan as raising a substantial new question of patentability as to claims 7, 12-16, 18-21, 23-24 and 71 of the '653 Patent.

It is agreed that consideration of Xaio and Hassan raises a SNQ as to claims 7, 12-16, 18-21, 23-24 and 71 of the '653 Patent.

Teachings of Xiao outlined in SNQ 1 above. Hassan further teaches hot extrusion of nickel reinforced magnesium alloys to modify the microstructure of Mg-Ni intermetallics (see abstract and section 2.3). Hassan further shows experimental evidence in Table 1 ("[b]Indicates the amount of Ni in the unreacted form present in composite samples") that nickel additives would remain unreacted and unalloyed.

Xiao was considered in an information disclosure statement but relied upon in the prosecution of the patent application which resulted in the '653 Patent, nor was it

considered in combination with Hassan. Hassan was not considered in the prosecution of the patent application which resulted in the '653 Patent. Therefore the teaching of Xiao taken with Hassan represents a new, non-cumulative teaching including old teachings presented in a different way, as compared with its use in the earlier concluded examination resulting in the '653 Patent. Further, there is a substantial likelihood that a reasonable examiner would consider these teachings important in deciding whether or not these claims are patentable. Accordingly, Xiao and Hassan considered together raises a substantial new question of patentability as to claims 7, 12-16, 18-21, 23-24 and 71 of the '653 Patent, which question has not been decided in a previous examination or reexamination of the '653 Patent.

Duty of Disclosure

The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving Patent No. 10,329,653 throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

Amendment in Reexamination Proceedings

Patent owner is notified that any proposed amendment to the specification and/or claims in this reexamination proceeding must comply with 37 CFR 1.530(d)-(j), must be

formally presented pursuant to 37 CFR 1.52(a) and (b), and must contain any fees required by 37 CFR 1.20(c).

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN E VINCENT whose telephone number is (571)272-1194. The examiner can normally be reached on 8:00am to 4:30pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean C Witz can be reached on 571-272-0927. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair.uspto.gov/epatent/portal/home.

Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000. Telephone Numbers for reexamination inquiries:

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Reexamination Facsimile Transmission No. (571) 273-9900

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Please FAX to:
(571) 273-9900
Central Reexamination Unit

/Sean E Vincent/
Patent Reexam Specialist, Art Unit 3991

Conferees:

/Timothy J. Kugel/
Patent Reexamination Specialist, CRU 3991

/Jean C. Witz/
Supervisory Patent Reexamination Specialist, CRU 3991

Substitute for form 1449/PTO, PTO/SB/08A and 08B, Form 6-2 and Form 6-2.1	Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	
	Filing Date	Herewith
	First Named Inventor	Brian P. Doud
	Art Unit	
	Examiner Name	
	Attorney Docket No.	2189.006

U. S. PATENT APPLICATION DOCUMENTS

EXAM INIT.	Cite No. [1]	Patent Number Number-Kind Code [2] (if known)	Name of Patentee or Applicant of Cited Document	Issue Date MM/DD/YYYY	
	P01	5,476,632	Shivanath et al.	12/19/1995	

U. S. PATENT APPLICATION PUBLICATION DOCUMENTS

EXAM INIT.	Cite No. [1]	Publication Number Number-Kind Code [2] (if known)	Name of Patentee or Applicant of Cited Document	Publication Date MM/DD/YYYY	

FOREIGN PATENT DOCUMENTS

EXAM INIT.	Cite No. [1]	Foreign Document No.[3] Country Code[4]- Kind Code[5] (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	T[6]
	F01	CN103343271A (Chinese-language accompanied by an English language abstract)	Xiao et al.	10/09/2013	
	F02	CN 103343271 (Certified English Language Translation)	Xiao et al.	10/09/2013	

NON-PATENT DOCUMENTS

EXAM INIT.	Cite No. [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	NPL01	HASSAN, S.F., GUPTA, M., Development of High Strength Magnesium Based Composites Using Elemental Nickel Particulates as Reinforcement., *Journal of Materials Science* 37, 2467–2474 (2002).
	NPL02	USPTO, Image File Wrapper for US Provisional Patent Application 61982425, filed 04/18/2014.
	NPL03	HAI ZHI YE, XING YANG, LIU, Review of Recent Studies in Magnesium Matrix Composters, *Journal of Materials Science 39* (2004).
	NPL04	HEMANTH, Joel, Fracture Behavior of Cryogenically solidified aluminum-alloy reinforced with Nano-ZrO2 Metal Matrix Composites (CNMMCs). *Journal of Chemical Engineering and Materials Science Vol. 2(8)*, August 2011.
	NPL05	SHAW, Barbara A., Corrosion Resistance of Magnesium Alloys, Pennsylvania State University. *ASM Handbook, Volume 13A Corrosion: Fundamentals, Testing, and Protection*
	NPL06	HENAGER, Charles H. Al-Fe Diagram, Hydrogen Permeation Barrier Coatings, Materials for the Hydrogen Economy, Chapter 8, CRC Press 2007, Editors: R. H. Jones, G. J. Thomas, pp 181-190.
	NPL07	LASZLO J. KECSKES ET AL., Al-Ni Diagram, Army Research Laboratory ARL-TR-5507, April 2011, ACombustion Synthesis Reaction Behavior of Cold-Rolled Ni/Al and Ti/Al Multilayers. p. 5.

Substitute for form 1449/PTO, PTO/SB/08A and 08B, Form 6-2 and Form 6-2.1	Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	
	Filing Date	Herewith
	First Named Inventor	Brian P. Doud
	Art Unit	
	Examiner Name	
	Attorney Docket No.	2189.006

	NPL08	Al-Cu Diagram, https://sites.google.com/site/eampotentials/Home/AlCu downloaded June 20, 2020
	NPL09	MCALISTER, A. J., Al-Ag Diagram, Bull. Alloy Phase Diagrams, 8(6):526-533, 1987.
	NPL10	PROFESSOR MIKE ASHBY, Cu-Ni Phase Diagram. Teach Yourself Phase Diagrams and Phase Transformations, 5th Edition, March 2009 Cambridge.
	NPL11	Illustrated portion of Cu-Ni Chart Phase Diagram. Materials Science and Engineering, 6th Edition by Callister and Rethwisch, 2003.
	NPL12	Ag-Cu Binary Phase Diagram. ASM Metals Handbook, 8th Edition, Vol. 8, Metallography, Structures and Phase Diagrams, 1973.
	NPL13	Mg-Pb Phase Diagram. ASM Metals Handbook, 8th Edition, Vol. 8, Metallography, Structures and Phase Diagrams, 1973.
	NPL14	Al-Mg Phase Diagram. ASM Metals Handbook, 8th Edition, Vol. 8, Metallography, Structures and Phase Diagrams, 1973.
	NPL15	Mg-Ni Diagram. ASM Metals Handbook, 8th Edition, Vol. 8, Metallography, Structures and Phase Diagrams, 1973.
	NPL16	JONES, D.A.; Principles and Prevention of Corrosion, 2nd Ed., 1996, p. 170 - Galvanic Series Table; 1996.

Examiner Signature: /Sean E Vincent/	**Date Considered:** 07/20/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
1 Applicant's unique citation designation number.
2 See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04.
3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3).
4 For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.
5 Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible.
6 Applicant is to place a check mark here if English language Translation is attached.

END

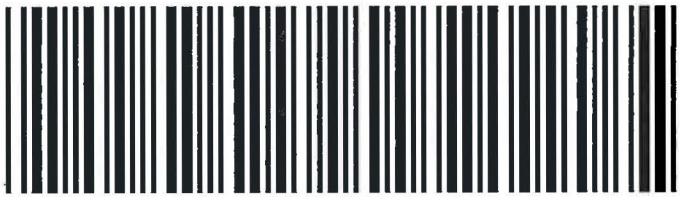
Application Number: 90/014,795

Official Correspondence (OC) System

START

Application Number: 90/014,795

Print Date: 07/26/2021



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